

**Two new species and a range extension of mud shrimps,
Upogebia, from Pacific Costa Rica and Mexico
(Decapoda: Thalassinidea: Upogebiidae)**

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Abstract.—Two new species of mud shrimps are described from the Pacific side of Middle America, *Upogebia baldwini* from the state of Nayarit, Mexico, and *U. vargasae* from Puntarenas Province, Costa Rica. The geographic range of the poorly known *U. burkenroadi* Williams, 1986 is extended from its type locality in the state of Sonora, Mexico to a documented Costa Rican occurrence. The new species are illustrated, and a key for identification of eastern Pacific species of *Upogebia* (Williams 1986) is amended to accommodate the new species. Cataloged lots of each species collected are listed.

Three species of mud shrimps, genus *Upogebia*, from the Pacific side of Middle America that have become known since the publication of Williams (1986) require more than routine identification. The first is a unique specimen of a new species collected in mangrove habitat from the state of Nayarit, Mexico by Aaron Baldwin in 1988. Additional material has not become available, so it seems inappropriate to delay description. A second new species, collected by Rita Vargas in 1995 from a mangrove habitat in Costa Rica, is described. Finally, specimens collected by J. Cortés from Costa Rica in 1991 are provisionally referred to *Upogebia burkenroadi* Williams, 1986 described from Sonora, Mexico, thus extending the geographic range of that species.

Specimens are deposited in the U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), or returned to the University of Costa Rica Museum of Zoology (UCRMZ), San José, as indicated in the species accounts.

Upogebia baldwini, new species

Fig. 1

Material.—USNM 251486. Holotype ♀, Estero Playa Novillero, Nayarit, Mexico,

dug from mangrove estero, coll. A. Baldwin, 5 Feb 1988.

Diagnosis.—Projections to either side of rostrum ending in acute spine. Postocular spine present. Abdominal sternites unarmed. Telson subrectangular, with transverse proximal ridge. Carpus of cheliped with 2 spines on mesiodistal margin, palm with row of spines on mesioventral surface. Merus of pereopod 2 with proximal mesioventral spine and subdistal dorsal spine; merus of pereopod 4 spineless.

Description.—Rostrum triangular, lateral margin shorter than basal width; lower margin nearly horizontal in lateral view but dorsal margin downturned, tip exceeding eyestalks; dorsal pair of strong subapical spines followed on each side by 4 erect marginal spines separated by subequal intervals; 3 spines mesial to marginal row at base on right side, none on left; central dorsal area hidden under setae. Rostral spines hidden by dense tufts of setae sprouting anterior to their bases, confluent with field of similar postrostral spines becoming smaller and less hidden posteriorly. Ridge lateral to field bearing crest of about 15–16 moderate to small spines,

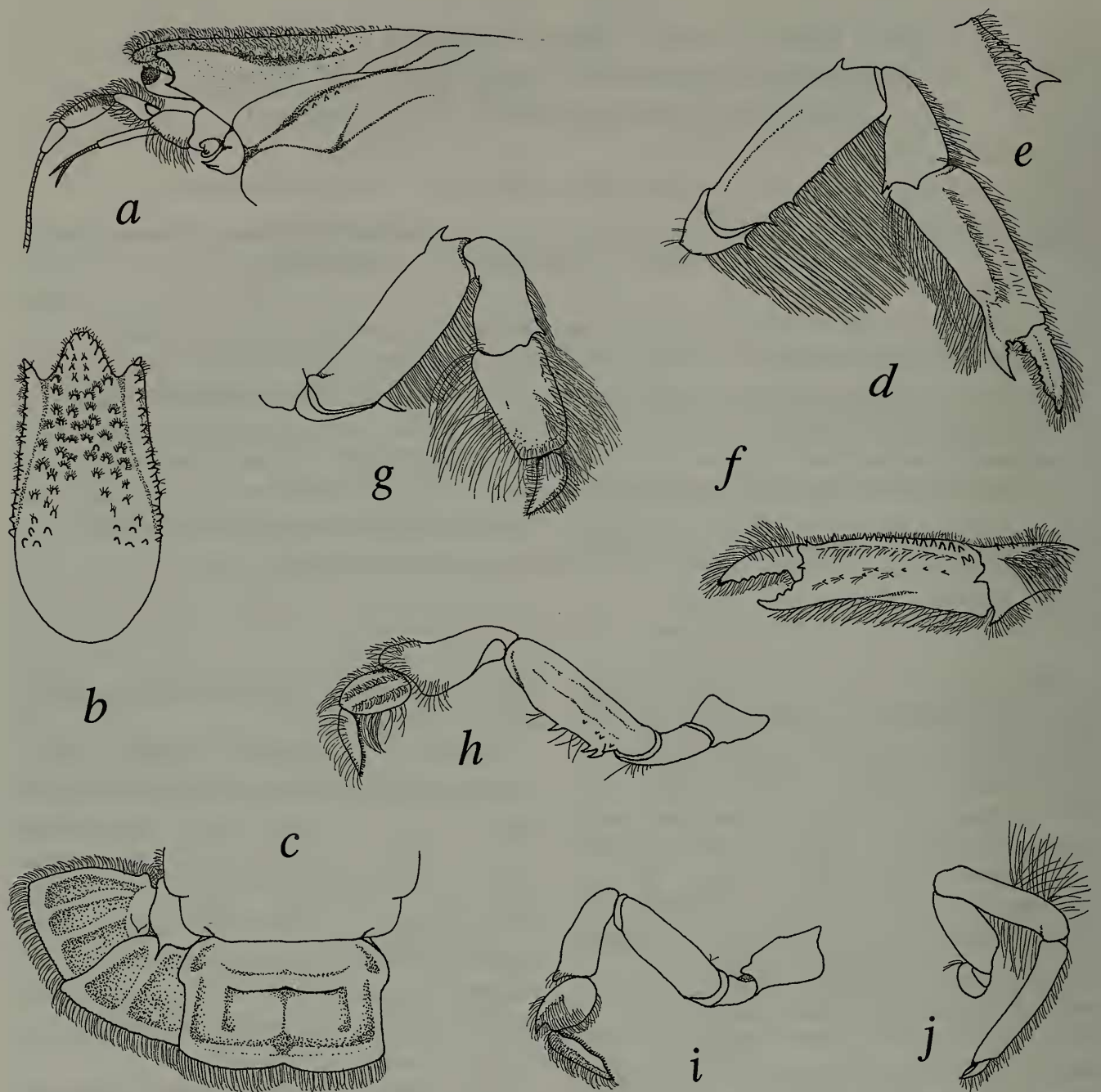


Fig. 1. *Upogebia baldwini*, USNM 251486, ♀ Holotype; a, cephalic region, lateral; b, anterior carapace, dorsal; c, telson, left uropod, part of abdominal segment 6, dorsal; d, cheliped, right lateral; e, crest of right cheliped carpus showing spines; f, chela and carpus, right mesial; g-j, right pereopod 2, left 3-4, right, 5.

strongest on process lateral to rostrum but decreasing posteriorly, with tendency to cluster at end of row. Shoulder lateral to cervical groove armed with tubercle on left side above intersection with thalassinidean line and with 4-9 obsolescent spines or tubercles to either side below intersection, line continuing strongly to posterior margin. Postocular spine present.

Abdomen with sternites on segments 1 and 2 wrinkled but not spined.

Telson with transverse proximal ridge confluent with low longitudinal ridge to either side.

Eyestalk stout, deepest at about mid-length, convex ventrally, horizontal in repose; cornea prominent, obliquely terminal, narrower than diameter of stalk, row of tiny forward trending spines above margin of cornea on mesial aspect.

Antennular peduncle reaching slightly beyond midlength of terminal article of an-

tenna peduncle, proximal 2 articles together slightly longer than terminal article.

Antennal peduncle with almost $\frac{1}{3}$ of length extending beyond tip of rostrum; scale moderate, oval.

Maxilliped 3 bearing epipod.

Epistomial projection rather broad in lateral view, bearing 2 small apical projections.

Chelipeds with ventral margin of ischium bearing 1 spine. Merus with row of 5 spines on ventral margin, proximal 2–3 modest in size, distal spines smaller; single subdistal dorsal spine reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, anterior ventrolateral corner bearing modest spine; mesiodorsal crest of 4 moderate spines partly obscured by setae behind prominent spine on anterior margin; 2 spines on anterodorsal margin mesial to articulation with propodus obscured by dense setae; strong spine near middle of anteromesial margin, smaller spine dorsal to it, and strong slender spine behind distoventral corner. Chela length about 5 times chela height; dorsal ridge spineless, stout spine mesial to it subdistally; mesiodorsal row of 13–14 erect to forward-hooked spines not reaching anterior part of palmar length; moderate spine below mesial dactylar condyle, single spine on margin below lateral condyle; mesial surface bearing setose longitudinal row of obsolescent spines on upper half, lower half bearing horizontal row of about 7 strong spines; transverse low ridge near proximomesial margin intersecting ventral ciliated keel. Fixed finger shorter than dactyl, continuing slightly sinuous trend of lower palmar margin and tapering to slender tip, 3 irregular teeth on proximal prehensile edge, strong double tooth in middle of row. Dactyl with corneous tip preceded on prehensile edge by crowded row of coalescent teeth ending in molariform tooth near toothless basal section; slightly enlarged tooth opposing tip of fixed finger; mesial more or less concave surface bearing few crowded pearly tubercles proximally, curved extensor surface bearing 2

rows of dense setae, with clustered granules proximally.

Pereopod 2 reaching to near midlength of cheliped palm; carpus with small acute distodorsal and subdistal ventral spines; merus with strong subdistal dorsal spine and proximal mesioventral spine. Pereopod 3 with merus bearing 4 ventral spines and clustered tubercles; coxa of female with slender spine lateral to gonopore. Pereopod 4 with spineless merus.

Uropod with acute spine on protopod above base of mesial ramus; mesial rib of lateral ramus bearing small acute proximal spine, distal margin of both rami bearing close-set row of tiny spines and spiniform granules except for short mesial sector on each.

Measurements in mm.—Holotype ♀, anterior carapace length 10.2, carapace length 15.4, chela length 7.3, chela height 2.3.

Remarks.—The specimen, dry when received, was softened in surfactant (Aerosol® OT Solution) and then preserved in 70% ethanol before study.

The eyestalks of *Upogebia baldwini* somewhat resemble those of *U. acanthops* Williams, 1986 in having an oblique anterior corneal surface, but there is no subterminal spine mesial to the cornea. Instead, there is a row of small forwardly trending spines dorsal to the cornea along its mesial margin. Other observed conspicuous differences from *U. acanthops* include: *U. baldwini* has no corneous spinules on pleura of abdominal segments 1 and 2, the rostrum has more spines on the lateral margin, the carpus of the cheliped has no spine preceding the spine at the anterolateral corner, rows of spines on the dorsal and mesial surfaces of the palm are more prominent, and the merus of leg 4 is spineless.

In comparison with similar eastern Pacific species in the genus, both *U. baldwini* and *U. longipollex* (Streets 1871) have the merus of leg 4 spineless, but *U. baldwini* is not thickly strewn with deciduous corneous spinules on its tail fan, abdominal sternites and pleura, and thoracic parts of the cara-

pace to either side of the thalassinidean line posterior to intersection with the cervical groove as is *U. longipollex*.

Etymology.—The species is named for Aaron Baldwin, then of Sea and Shore Museum, Port Gamble, Washington, who collected this and other decapod crustaceans from Pacific Middle America.

Upogebia vargasae, new species

Fig. 2

Material.—USNM 251484. Holotype ♂, Boca Guarumal [08°52'N, 83°36'W, Puntarenas Prov.], Costa Rica, Mangroves of Teraba-Sierpe, from burrows with thick walls, coll. with *Upogebia spinigera* (Smith), Rita Vargas, 23 Nov 1995. USNM 251485. Paratypes, 1 ♂, 3 ♀ (1 ovig.), same. Both holotype and paratypes from UCRMZ, Cat. No. 2108-02; 1 ♂ and 4 ♀ returned to UCRMZ.

Diagnosis.—Projections to either side of rostrum ending in laterally divergent acute spine. Postocular spine present. Abdominal sternites armed. Telson subrectangular with strongly spined transverse proximal ridge. Carpus of cheliped with 2 spines on mesiodistal margin, palm without row of spines on mesioventral surface but with cluster of scattered spines there. Merus of pereopod 2 with proximal mesioventral spine and subdistal dorsal spine; merus of pereopod 4 spineless.

Description.—Rostrum triangular, lateral margin shorter than basal width; nearly horizontal in lateral view, tip exceeding eyestalks; dorsal pair of strong subapical spines followed on each side by 2–3 erect marginal spines separated by subequal intervals, spine mesial to marginal row at base, central dorsal area hidden under setae spineless and glabrous. Rostral spines, confluent with field of postrostral spines, hidden by dense tufts of setae sprouting anterior to their bases. Ridge lateral to field bearing crest of about 10–12 moderate to small spines, strongest on divergent process lateral to rostrum and decreasing almost to obsoles-

cence posteriorly. Shoulder lateral to cervical groove armed with 0–2 obsolescent spines or tubercles above and 2–5 spines below its intersection with thalassinidean line, latter continuing strongly to posterior margin, additional 0–2 spines or tubercles above it on lateral aspect of head. Postocular spine present.

Abdomen armed with many spinules on sternites and few spinules on margin of pleura, mainly on segments 1 and 2.

Telson with proximal transverse proximal ridge bearing row of acute reclining spines directed posteriorly, confluent with low longitudinal ridge to either side occasionally bearing 1 or 2 spines proximally.

Eyestalk stout, deepest at about midlength, convex ventrally, angled slightly upward in repose; cornea prominent, oval, obliquely terminal, narrower than diameter of stalk, few tubercles on mesial aspect near base.

Antennular peduncle not quite reaching midlength of terminal article of antennal peduncle, proximal 2 articles together slightly longer than terminal article.

Antennal peduncle with almost $\frac{2}{5}$ of length extending beyond tip of rostrum; antepenultimate article bearing ventral subterminal spine; scale moderate, oval.

Maxilliped 3 bearing epipod.

Epistomial projection rather broad in lateral view, bearing 2 small apical projections.

Chelipeds with ventral margin of ischium bearing 1 spine. Merus with row of 4–5 relatively strong spines on ventral margin; single subdistal dorsal spine reaching level of postocular spine. Carpus trigonal, shallow longitudinal groove laterally, anterior ventrolateral corner with strong spine preceded by 2 much smaller spines; mesiodorsal crest of 5–10 moderate spines behind prominent spine on anterior margin partly obscured by setae in proximal part of row, series often asymmetrical; 4 or fewer spines on anterodorsal margin mesial to articulation with propodus often obscured by dense setae; strong spine near middle of anteromesial

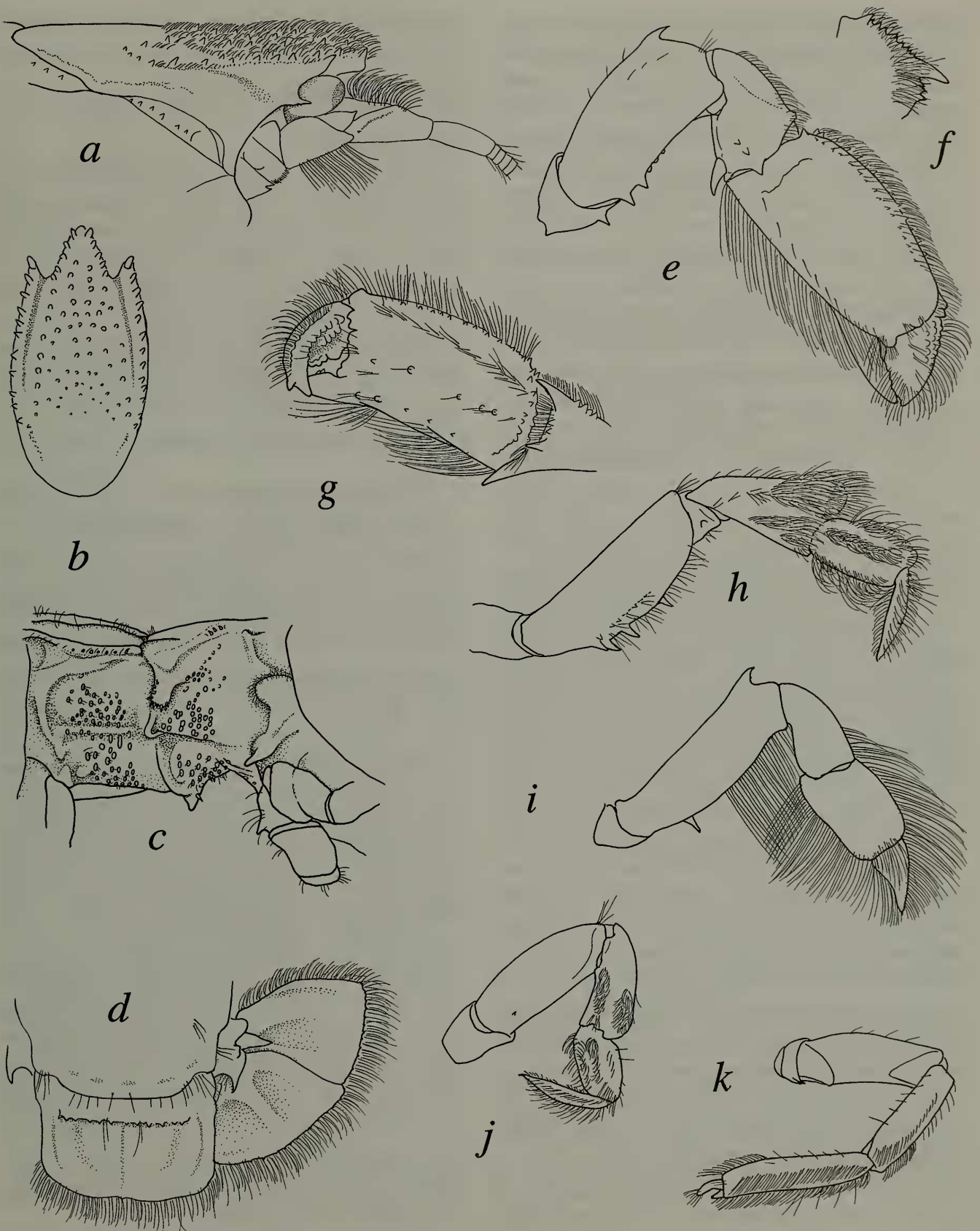


Fig. 2. *Upogebia vargasae*, USNM 251484, ♂ Holotype; a, cephalic region, lateral; b, anterior carapace, dorsal; c, parts of abdominal segments 1-2 showing spinules on sternites and edge of pleura, oblique view; d, telson, right uropod, part of abdominal segment 6, dorsal; e, cheliped, right lateral; f, crest of right cheliped carpus showing spines; g, chela and carpus, right mesial; h-k, right pereopods 2-5.

margin, smaller similar spine dorsal to it, and very strong spine behind distoventral corner. Chela length about 2.3–3.2 chela height; low dorsal ridge bearing 9–17 variable spines partly obscured by setae, spines on distal part of ridge tending to obsolescence, stout spine mesial to ridge subdistally; mesiodorsal row of about 10–12 irregularly distributed small spines or spiniform tubercles becoming reduced in size or obsolescent near distal $\frac{2}{3}$ of palmar length and with tendency for development of scattered spines around proximal end of row; moderate spine and row of about 4–5 smaller rounded teeth below mesial dactylar condyle, single spine on margin below lateral condyle; mesial surface bearing longitudinal row of 15 spines on upper half, prominent proximally but obsolescent distally, lower half bearing about 6–8 spines variable in position but tending to arrangement in oblique line or tract, holotype male with additional 4–5 mesioventral spines near or on ventral keel; transversely sinuous granulo-tuberculate ridge near proximomesial margin intersecting ventral ciliated keel bearing 2–4 obsolescent tubercles or spines. Fixed finger shorter than dactyl and more slender, continuing slightly sinuous trend of lower margin of palm and tapering to slender tip, 2–4 irregular strong teeth on proximal prehensile edge. Dactyl with corneous tip preceded on prehensile edge by strong subdistal tooth and crowded row of 7–8 small coalescent teeth ending in much larger tooth near base, basal section toothless; mesial more or less concave surface bearing 2 rows of closely crowded tubercles, pearly on proximal half, upper row running nearly length of finger, lower row only half as long; curved extensor surface bearing 2 rows of setae, clustered rows of tubercles between them proximally.

Pereopod 2 reaching to near midlength of cheliped palm; carpus with distodorsal and subdistal ventral spines obsolescent; merus with strong subdistal dorsal spine and proximal mesioventral spine. Pereopod 3 with merus bearing 4 ventral spines, a few tu-

bercles or spiniform tubercles and scattered setae; coxa of female with broad spine lateral to gonopore. Pereopod 4 occasionally with obsolescent, proximal, ventrolateral spine on merus.

Uropod with acute strong spine on propod above base of mesial ramus; mesial rib of lateral ramus bearing proximal spine, distal margin of both rami bearing row of small spines and spiniform granules except for short mesial sector on each.

Measurements in mm.—Holotype ♂, anterior carapace length 11.0, carapace length 15.9, chela length 11.9, chela height 4.9; paratype ovigerous ♀, same, 10.5, 15.2, 8.2, 2.6.

Remarks.—*Upogebia vargasae* is most closely allied with *U. longipollex* and *U. spinigera* (Smith 1871), but it differs from each in having a row of strong reclining, posteriorly directed spines on the transverse proximal ridge of the telson, and all spines on the uropods are more strongly developed than in those species. *Upogebia vargasae* lacks the tiny deciduous spinules that are characteristically distributed over dorsal surfaces of the tail fan in *U. longipollex* as well as on external surfaces of its abdominal pleura and on thoracic parts of its carapace to either side of the thalassinidean line posterior to intersection with the cervical groove. *Upogebia vargasae* and *U. longipollex* have conspicuously developed spinules on abdominal sternites and pleura, but *U. spinigera* has these only on the pleura. Much like *U. longipollex*, *U. vargasae* usually has a spineless merus on pereopod 4, but occasionally there is an obsolescent, proximal, lateroventral spine; that of *U. spinigera* is armed with ventral and ventrolateral spines and tubercles.

Etymology.—The species is named for Rita Vargas, University of Costa Rica Biology School, who collected this and other thalassinideans from Pacific Costa Rica.

Discussion.—In a key to known Eastern Pacific species of *Upogebia* (Williams 1986:7–10), the following insertion in p. 8

will aid in identification of new species described above:

12. Eyestalks with cornea normally rounded distally13
 – Eyestalks obliquely truncate distally, cornea triangular in lateral view12a
 12a. Eyestalk bearing short subterminal spine mesial to reduced, triangular cornea; merus of leg 4 bearing ventral spines and tubercles. Panama *U. acanthops* Williams
 – Eyestalk bearing row of small forward trending spines on dorsal surface mesial to margin of cornea; merus of leg 4 usually spineless. Nayarit, Mexico
 *U. baldwini* n. sp.
 13. Telson with proximal transverse ridge spineless13a
 – Telson with proximal transverse ridge bearing row of acute reclining spines directed posteriorly; merus of leg 4 usually spineless. Costa Rica *U. vargasae* n. sp.
 13a. Abdominal segments 1 and/or 2 spined ventrally on sternites or edge of pleura14
 – Abdominal segments 1 and/or 2 lacking ventral spines15

Upogebia burkenroadi Williams, 1986

Material.—University of Costa Rica, UCR 1708. 1♂, 1♀, Punta Pitahaya, Guanacaste, 8–10 m, coll. J. Cortés, 15 Jun 1991. Note on back of label translated from Spanish, “Living in holes covered with mud, 5 × 5 mm, chambers approx. 5 mm diameter, connection to exterior covered with sand and some algae.”

Measurements in mm.—♀, anterior carapace length 3.9, carapace length 5.3, chela length 3.3, chela height 1.0; ♂, same, 4.5, 6.5, 4.4, 1.2.

Remarks.—*Upogebia burkendroadi* Williams, 1986, described on the basis of a

male (holotype) and female (paratype), with no accompanying ecological information, were the only specimens of the species known, until the material listed above came to my attention. I provisionally refer the Costa Rican material to this species after comparison with the type series. Except for smaller size, the Costa Rican specimens seem almost identical to the types, but a noticeable difference is presence of a corneous tip on the prehensile edge of the cheliped dactyl in the type specimens, whereas this feature is reduced or absent in the smaller Costa Rican specimens. Development of this feature may be an age dependent character.

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